

## What is Claimed is:

- [c1] A comparator comprising:  
a circuit for setting a trip point of a rising edge of an input signal according to a value of an external voltage reference; and  
at least two transistors, in said circuit, for setting a trip point of a falling edge of said input signal according to a width-to-length ratio of said at least two transistors.
- [c2] The comparator of claim 1, wherein said comparator cycles between an analog circuit and a digital circuit.
- [c3] The comparator of claim 2, wherein in said analog circuit, one of said at least two transistors is a tail current source transistor, and wherein said input signal rises from ground toward a positive power supply voltage, wherein said rise in said input signal switches said tail current source transistor on.
- [c4] ~~X~~ The comparator of claim 3, further comprising a plurality of transmission gates in said circuit, wherein said rise in said input signal causes said comparator to appear as a differential pair in an open loop configuration.
- [c5] The comparator of claim 2, wherein in said digital circuit, said input signal is at an input voltage greater than said external reference voltage.
- [c6] The comparator of claim 5, further comprising a plurality of transmission gates in said circuit, wherein said input signal causes said comparator to appear as an asymmetric inverting Schmitt trigger.
- [c7] The comparator of claim 1, wherein said at least two transistors comprises:  
a first transistor of length ( $L_x$ ) and a width of ( $W_x$ ); and  
a second transistor of length ( $L_y$ ) and a width of ( $W_y$ ),  
wherein said width-to-length ratio equals  $(W_x L_y)/(W_y L_x)$ , and  
wherein as said input signal decreases, a switching threshold becomes dependent on said width-to-length ratio.
- [c8] The comparator of claim 7, wherein said trip point of a falling edge of an input signal decreases by decreasing said width-to-length ratio.

[c9] The comparator of claim 7, wherein said trip point of a falling edge of an input signal increases by increasing said width-to-length ratio.

[c10] A comparator comprising:

a circuit for setting a trip point of a rising edge of an input signal according to a value of an external voltage reference; and  
at least two transistors, in said circuit, for setting a trip point of a falling edge of the input signal according to a width-to-length ratio of said at least two transistors,  
wherein said comparator cycles between an analog circuit and a digital circuit,  
wherein said trip point of a falling edge of an input signal decreases by decreasing said width-to-length ratio, and  
wherein said trip point of a falling edge of an input signal increases by increasing said width-to-length ratio.

[c11] The comparator in claim 10, wherein said at least two transistors comprises:

a first transistor of length ( $L_x$ ) and a width of ( $W_x$ ); and  
a second transistor of length ( $L_y$ ) and a width of ( $W_y$ ),  
wherein said width-to-length ratio equals  $(W_x L_y)/(W_y L_x)$ , and  
wherein as said input signal decreases, a switching threshold becomes dependent on said width-to-length ratio.

[c12] The comparator of claim 10, wherein said analog circuit further comprises a tail current source transistor, and wherein said input signal rises from ground toward a positive power supply voltage, wherein said rise in said input signal switches said tail current source transistor on.

[c13] The comparator of claim 12, further comprising a plurality of transmission gates in said circuit, wherein said rise in said input signal causes said comparator to appear as a differential pair in an open loop configuration.

[c14] The comparator of claim 10, wherein in said digital circuit, said input signal is an input voltage greater than said external reference voltage.

[c15] The comparator of claim 14, further comprising a plurality of transmission gates

in said circuit, wherein said input signal causes said comparator to appear as an asymmetric inverting Schmitt trigger.

[c16] A comparator for controlling a trip point of a rising and falling edge of an external input signal comprising a first portion operatively connected to a second portion, wherein said comparator cycles between an analog circuit and a digital circuit.

[c17] The comparator of claim 16, wherein said analog circuit comprises:

- an input signal source inputting an input signal;
- an output signal source;
- a power supply voltage source;
- an external input signal source;
- a tail current source transistor operatively connected to said power supply voltage source;
- a first pair of transistors operatively connected to said tail current source transistor, said input signal source, and said external input signal source;
- a second pair of transistors operatively connected to said first pair of transistors; and
- a plurality of invertors operatively connected to said output signal source, said first pair of transistors, and said second pair of transistors.

[c18] The comparator of claim 16, wherein said digital circuit comprises:

- an input signal source inputting an input signal;
- an output signal source;
- a power supply voltage source;
- a tail current source transistor operatively connected to said power supply voltage source and said input signal source;
- a first pair of transistors operatively connected to said tail current source transistor and said input signal source;
- a current mirror load transistor operatively connected to said input signal source and said first pair of transistors; and
- a plurality of invertors operatively connected to said output signal source, said first pair of transistors, and said current mirror load transistor.

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[c19] The comparator of claim 17, wherein in said analog circuit, said input signal rises from ground toward a positive power supply voltage, wherein said rise in said input signal switches said tail current source transistor on.

[c20] The comparator of claim 18, wherein in said digital circuit, said input signal is an input voltage greater than said external reference voltage.

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